

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WOBF04CNRMES	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/FR2005/000135	International filing date (day/month/year) 21.01.2005	Priority date (day/month/year) 22.01.2004
International Patent Classification (IPC) or national classification and IPC G01B9/02, A61B3/12		
Applicant CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 10 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>	
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>	

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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Box No. 1 Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:

- ☐ international search (Rule 12.3 and 23.1(b))
☐ publication of the international application (Rule 12.4)
☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-17 _____ as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. 1-26 _____ as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* _____ received by this Authority on _____

nos.* _____ received by this Authority on _____

☒ the drawings:

sheets 1/3-3/3 _____ as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (specify): _____

☐ any table(s) related to sequence listing (specify): _____

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☒ the claims, nos. 1, 5, 11, 14, 20 _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (specify): _____

☐ any table(s) related to sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4-21, 23-26	YES
	Claims	1, 2, 3, 22	NO
Inventive step (IS)	Claims		YES
	Claims	1-26	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1 = C. K. HITZENBERGER ET AL.: "DIFFERENTIAL
PHASE CONTRAST IN OPTICAL COHERENT TOMOGRAPHY"
OPTICS LETTERS, vol. 24, no. 9, 1 May 1999
(1999-05-01), pages 622-624, XP001183361;

D2 = US-A-3 849 001;

D3 = US-A-5 973 784;

D4 = US-A-5 877 856;

D5 = US-A-4 541 697;

D6 = US-A-5 239 411;

D7 = FR-A-2 828 396.

1. PCT Article 19

Some of the amendments filed with the
International Bureau in compliance with PCT
Article 19(1) cause the subject matter of the
application to be extended beyond the content of
the application as originally filed. As a result,
said amendments are contrary to the provisions of
PCT Article 19(2).

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The amendments in question are as follows:

- (i) The expression "detection arm" in **claims 1, 5, 11, 14 and 20** is not supported by the application as originally filed. Indeed, the application as originally filed defines a Michelson interferometer "output arm" (page 1, §3 and 4 and page 10, line 31 to page 11, line 9). Moreover, the Michelson interferometer detection arm does not, in principle, have the same meaning as the Michelson interferometer output arm. As a result, positioning the Wollaston prism in the Michelson interferometer detection arm has a different meaning. This causes the subject matter of the application to be extended beyond the content of the application as originally filed because this feature is not defined anywhere in the application as originally filed.
- (ii) The applicant has removed the following feature from **claim 1**:
- "the deflection means are arranged inside the interferometer as a replacement for the single polariser".

However, in the disclosure of the invention *per se*, this feature is presented as being essential for carrying out the invention with regard to the technical problem that the invention is intended to solve (page 3, §2 and 3). The removal of this feature means that both a single polariser and deflection means can be simultaneously arranged

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inside the interferometer. This, however, would require modification of the device so that, despite the presence of the single polariser, it would still be possible to use the light projected in a direction perpendicular to the polariser direction. This is not, however, described in the application as originally filed. It follows that the removal of this feature causes the subject matter of the application to be extended beyond the content of the application as filed.

(iii) The applicant has removed the following feature from **claim 5**:

- "re-insert ... together"

The expression "re-insert ... together" as originally filed is synonymous with the term "recombine". However, the term "re-insert" does not mean to recombine and has a broader meaning, which is not supported by the documents as originally filed.

(iv) The applicant has added the following features to **claim 20**:

- "between the interferometer measurement arm and an eye to be examined or inside the measurement arm"; and
- "or inside the detection arm thereof".

In the application as originally filed, the adaptive optical means are described in relation to figure 5. In said figure, said means are arranged inside the interferometer measurement

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arm, not between the measurement arm and an eye.
No adaptive optical means arranged between the measurement arm and an eye are described anywhere else in the application as originally filed.

The detection means in figure 5 of the application as originally filed are arranged downstream from the interferometer, not inside the detection arm thereof. No detection means arranged inside the detection arm are described anywhere else in the application as originally filed.

(v) The applicant has removed the following feature from **claim 20**:

- "without any synchronous detection or modulation".

However, in the disclosure of the invention *per se*, this feature is presented as being essential for carrying out the invention with regard to the technical problem that the invention is intended to solve (page 1, §4, page 2, §4 and page 8, lines 8 to 10). The removal of this feature means that, despite the significant drawbacks of synchronous detection with modulation, this technique is not excluded from the device as per the present application. This would, however, require the device to be modified in a manner that is not described in the application as originally filed. It follows that the removal of this feature causes the subject matter of the application to be extended beyond the content of the application as filed.

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In view of the objections set out above, the preliminary examination report is based on the claims as originally filed.

2. Lack of novelty

The present application does not fulfil the requirements set forth in PCT Article 33(1) because the subject matter of the following claims does not comply with the requirement of novelty defined in PCT Article 33(2).

Independent device claim 1

Documents D1 to D3 each describe a device for measuring a fringe contrast (the title, abstract and figures), including means for deflecting two perpendicular input polarisations in two different output directions (D1: "Wollaston prism" in figure 1 and page 622, §3 to page 623, §1; D2: "Wollaston prism (9)" in figure 5 and column 5, lines 7 to 29; D3: "Wollaston prism (62)" in figure 3 and column 4, line 64 to column 5, line 4). Document D1 further describes means that are located in the interferometer output arm and are suitable for deflecting two perpendicular input polarisations in two different output directions (D1: "Polarizing Beam Splitter (PBS)" on page 623, left-hand column, lines 1 to 9 and figure 1).

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It follows that documents D1 to D3 each describe all of the features in the present **claim 1**.

Claim 2

The Wollaston prism is known from each of documents D1 to D3 (see above).

Claim 3

The device used with a Michelson interferometer that is implemented in an optical coherence tomography system is known from document D1 (figure 1).

Independent device claim 22

Document D4 describes a system for examining an eye by means of *in-vivo* tomography (the title, abstract and figures and column 1, lines 9 to 10), including a Michelson interferometer that performs full-field OCT (column 3, lines 50 to 55 and figure 1), adaptive optical means (column 3, lines 56 to 65), detection means ("photodetector (11)" in figure 3) as well as a fringe contrast measurement device that includes means for deflecting two perpendicular input polarisations in two different output directions ("Wollaston prism (18)").

It follows that D4 describes all of the features in the present **claim 22**.

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3. Lack of inventive step

The present application does not fulfil the requirements set forth in PCT Article 33(1) because the subject matter of the following claims does not involve an inventive step as defined in PCT Article 33(3).

Claims 4 and 14

A step difference of $\lambda/2$ or $\lambda/4$ is known from D4 (claim 1).

Claims 5-11, 15-18 and 23-24

These claims suggest slight structural modifications to the devices and method described in claims 1, 12 and 22. Said modifications would be obvious to a person skilled in the art and the resulting advantages are easily foreseeable.

As a result, the subject matter of said claims does not involve an inventive step.

Independent method claim 12

The subject matter of claim 12 differs from that in document D1 in that the Wollaston prism explicitly deflects the two perpendicular input polarisations. This feature is intrinsic to a

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Wollaston prism and, together with the resulting advantages, is well known to a person skilled in the art (see also the explicit description in this regard in documents D2 and D3). As a result, it would be obvious for a person skilled in the art to use this feature with a corresponding effect in a device as per document D1 and thereby arrive at a method as per claim 19.

It follows that the subject matter of **claim 12** does not involve an inventive step either.

Claim 13

The optical coherence tomography system is known from D1 (figure 1).

Dependent claims 19, 20, 25 and 26

A doublet of this kind is known from D6 (claim 1).

Dependent claim 21

Out-of-focus operation is known from document D7 (page 13, lines 27 to 31 and page 14, lines 13 to 26).

4. Observation

The dependency of claims 23 to 26 is incorrect.